

Application No. 09/867,227
Response to Office Action of January 27, 2006

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REMARKS/ARGUMENTS

Claims 15-19, 21-24, 34, and 35 are pending. Favorable reconsideration is respectfully requested in light of the Remarks below.

At the outset, Applicants thank Examiner Dicus for withdrawing the 102(b) rejection in the last Office Action.

The rejection of Claims 15-19, 21-24, 34, and 35 under 35 U.S.C. §103(a) over US Patent No. 5,605,750 (US'750) and/or US 6379,780 (US'780) is traversed below. The below traversal of the outstanding rejection is organized by first reviewing the claimed invention and the prosecution history thus far. Further, a review of the disclosures of US'950 and US'780 follows. Finally, a presentation of how both US'950 and US'780 fail to disclose or suggest anywhere therein all aspects of the claimed invention is provided. This presentation is based, in part, on the definition of a crosslinking agent and the specific mechanism the specific class of crosslinking agents encompassing divinylbenzene disclosed within US'780 uses to crosslink polymers such as those containing styrene and methyl methacrylate. Such presentation will demonstrate that the crosslinking agents, after crosslinking polymers containing styrene and methylmethacrylate such as PMMA, are no longer capable to function as crosslinking agents because such crosslinking agents become a part of the crosslinked polymer matrix at the crosslinking sites. Therefore, the presentation will demonstrate that the disclosure of US'780 fails to provide what US'950 lacks to disclose or suggest the claimed invention, which is the presence of a crosslinking agent in a microporous coating.

The present invention relates, in part, to products having a microporous coating containing a cross-linking agent, at most 90 parts of colloidal inorganic particles (or submicron inorganic particles); and at least 10 parts of a polymeric binder, where the weight percentage of colloidal inorganic particles (or submicron inorganic particles) is greater than the weight percent of polymeric binder (see Claims 15, 34 and 35). Claims 15 and 34 relate to an ink receiving medium containing this coating. Claim 35 relates to the microporous

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coating itself. Claim 34 further relates to situations where the colloidal inorganic particles are replaced with submicron inorganic particles.

At best, US'750, discloses a media having a coating on one side of a film. US'750 fails altogether to disclose the claimed invention because US'750 fails altogether to disclose or suggest a coating and/or ink receiving medium containing a cross-linking agent. Accordingly, US'750 fails to disclose all claim limitations of the claimed invention, much less create a prima facie case of obviousness.

At best, US'780, discloses an imaging support having a polyester bottom layer and a permeable upper layer. However, US'780 fails altogether to disclose a coating contains a cross-linking agent, at most 90 parts of colloidal inorganic particles; and at least 10 parts of a polymeric binder. Accordingly, US'780 fails to disclose and/or suggest the claimed invention.

During prosecution, the Office has relied on US'950 as the primary reference. Until recently, the Office has alleged that because the US'950 discloses a microporous coating containing colloidal inorganic particles, a binder and crosslinked polymethyl methacrylate (PMMA), then the US'950 discloses a coating containing inorganic particles, a binder and a crosslinking agent. Applicants have contended that such allegations are incorrect because the crosslinked PMMA may not be crosslinked with a crosslinking agent, but rather a photo-induced crosslinking that does not utilize crosslinking agent functionality. In the present outstanding Office Action, it appears as if the Office has withdrawn the rejection based solely on US'950. Applicants again thank the Office for withdrawing this ground of rejection. Further, the Office has set forth another ground of rejection alleging that while US'950 fails to disclose that the crosslinked PMMA contains a crosslinking agent, US'780 demonstrates that methyl methacrylate containing polymers may contain crosslinking agents because such polymers may be used in crosslinked polymethyl methacrylate (See page 3, lines 7-15, of the outstanding Office Action). Thus, the office first alleges that one reading US'780 would crosslink a polymethyl methacrylate (PMMA) with a crosslinking agent, thereby producing a

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crosslinked PMMA that contains a crosslinking agent; and then secondly alleges that the same person would include the crosslinked PMMA that contains a crosslinking agent into the microporous coating of US'950 to create the claimed microporous coating (*containing a cross-linking agent, at most 90 parts of colloidal inorganic particles; and at least 10 parts of a polymeric binder, where the weight percentage of colloidal inorganic particles is greater than the weight percent of polymeric binder*).

Applicants respectfully traverse the Office's rejections and allegations on the basis that the Office's interpretation of US'780 is incorrect in that the crosslinked PMMA does not contain any active crosslinking agent because of the following: 1) the crosslinking agents described in US'780 are not catalysts; 2) there is not an excess of crosslinking agents in the resultant crosslinked product when the crosslinking agents of US'780 functions upon polymers of styrene and/or PMMA; 3) the crosslinking agents become incorporated into the crosslinked polymer matrix via covalent bonds which changes their chemistry; and 4) the crosslinking agents lose their crosslinking functions/capabilities when they become incorporated into the crosslinked polymer matrix. Accordingly, even if one were to create a crosslinked PMMA as disclosed in US'780 and add it to the microporous coating of US'950, there is still no crosslinking agent present in the coating because the crosslinking agent becomes incorporated into the crosslinked PMMA matrix, destroying its crosslinking agent function in the process. Therefore, the crosslinking agent's function is destroyed prior to placement into the microporous coating according to US'950.

US'780 discloses:

"Examples of typical monomers for making the cross-linked polymer microbeads include styrene, butyl acrylate, acrylamide, acrylonitrile, methyl methacrylate, ethylene glycol dimethacrylate, vinyl pyridine, vinyl acetate, methyl acrylate, vinylbenzyl chloride, vinylidene chloride, acrylic acid, divinylbenzene, arylamidomethyl-propane sulfonic acid, vinyl toluene, etc. Preferably, the cross-linked polymer is polystyrene or poly(methyl methacrylate). Most preferably, it is polystyrene, and the cross-linking agent is divinylbenzene." (See column 5, lines 9-18).

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Therefore, according to the above in US'780, polymers containing monomers such as styrene and methyl methacrylate are polystyrene and poly(methyl methacrylate); and, such polymers are to be chemically crosslinked by crosslinking agents (i.e. divinylbenzene when the polymer is polystyrene).

Further, US'780 discloses:

"Normally, for the polymer to have suitable physical properties such as resiliency, the polymer is cross-linked. In the case of styrene cross-linked with divinylbenzene, the polymer is 2.5-50% cross-linked, preferably 20-40% cross-linked. By percent cross-linked, it is meant the mol % of cross-linking agent based on the amount of primary monomer. Such limited cross-linking produces microbeads which are sufficiently coherent to remain intact during orientation of the continuous polymer. Beads of such cross-linking are also resilient, so that when they are deformed (flattened) during orientation by pressure from the matrix polymer on opposite sides of the microbeads, they subsequently resume their normal spherical shape to produce the largest possible voids around the microbeads to thereby produce articles with less density." (See column 10, lines 24-28).

Therefore, according to the above in US'780, the polymers of US'780 only have useful properties when the polymer is crosslinked. But according to US'780, not any crosslinking reaction provides useful crosslinked polymers. Instead, US'780 discloses that only those crosslinked polymers that are made from crosslinking reaction conditions where the crosslinking agent is present at an amount that is less than the total number of monomers in the polymer. In fact, not all of the sites in the polymer that are capable of being crosslinked are actually crosslinked, but rather from 2.5 to 50% are crosslinked. Accordingly, the chemical crosslinking agents mentioned therein US'780 must be the limiting reagent in the crosslinking reaction and no excess crosslinking agent is disclosed. The above disclosure of US'780 is very important because it demonstrates that US'780 does not disclose situations where the crosslinked polymers such as crosslinked PMMA contain excess, unreacted crosslinking agent. In fact, US'780 teaches away from such situations.

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Further, US'780 discloses:

" . . . the hereinabove described polyesters which include copolymerized therein up to 20 percent by weight of a second acid or ester thereof having reactive olefinic unsaturation and mixtures thereof, and a cross-linking agent selected from the group consisting of divinyl-benzene, diethylene glycol dimethacrylate, diallyl fumarate, diallyl phthalate, and mixtures thereof." (emphasis added, See column 5, line 2-8).

Therefore, according to the above in US'780, the crosslinking agents of US'780 become incorporated into the polymer matrix via covalent bond attachment thereto by copolymerization with the polymers.

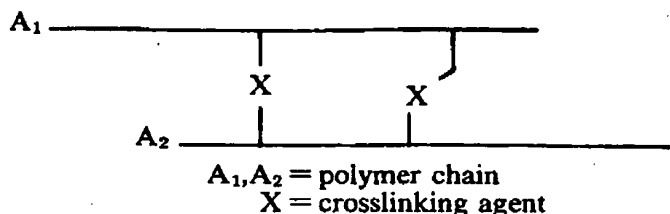
In view of all of the above, US'780 clearly discloses that the crosslinking reaction of polymers such as PMMA must occur in the presence of limited amounts of crosslinking agent such that the crosslinking agent is incorporated into the resultant crosslinked polymer matrix.

This is further recognized in the art of crosslinking polymers as demonstrated by the attached definition of "cross-linking" from "Hawley's CONDENSED CHEMICAL DICTIONARY", 12th edition (1993). (see attached Exhibit A). Hawley's clearly demonstrates that it is known in the art that "cross-linking" is the result of two polymer chains (i.e. A₁ and A₂) reacted together in the presence of a crosslinking agent (i.e. X) which results in the incorporation of the crosslinking (i.e. X) into the crosslinked polymer matrix via covalent attachment. The crosslinking agent thus loses its crosslinking functionality via this reaction; and most importantly, can not serve as a crosslinking agent again.

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(The below is taken from Hawleys)



The generally accepted definition and function of a chemical crosslinker (as demonstrated by Hawley's discussed above) is completely different, distinct, and directly opposite than that of a "catalyst". A "catalyst" is a substance that affects the rate of a chemical reaction without itself being consumed or undergoing a chemical change. Accordingly, a catalyst remains present and chemically unaltered even after the reaction is completed while the chemical crosslinking agent discussed in US'780 is consumed by the crosslinking agent via chemical alteration and covalent attachment to the polymers (see above).

In light of all of the above, crosslinking agents of US'780 are no longer capable of performing their crosslinking function because such crosslinking agents are depleted as they become covalently bonded to the polymer at the crosslinking sites during the crosslinking reaction. Further, US'780 discloses the importance of keeping the crosslinking agent as the limiting reagent in the crosslinking reaction so as to maintain good properties in the resultant product. Accordingly, there is no excess crosslinking agent present in the product according to US'780. Therefore, even if one were to crosslink PMMA according to US'780, the resultant product could not possibly contain crosslinking agent because the agent has been incorporated into the product itself via chemical modification thereof.

In review, the Office supports the outstanding rejection by first alleging that one reading US'780 would crosslink a polymethyl methacrylate (PMMA) with a crosslinking agent, thereby producing a crosslinked PMMA that contains a crosslinking agent. In light of all of the above, Applicants respectfully submit that the Office's first allegation is incorrect. In fact, US'780 discloses that that it is not even possible, especially in light of the generally

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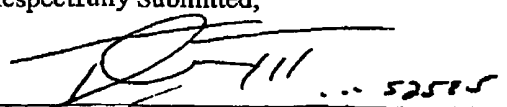
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accepted definition of crosslinking and crosslinking agent (contrasted with that of a catalyst). The crosslinker of US'780 is not a catalyst; and therefore, does not remain in the crosslinked PMMA. Therefore, even if one were to make crosslinked PMMA according to US'780 and add the crosslinked PMMA to the microporous coating disclosed in US'950, the resultant microporous coating would not be the claimed microporous coating (*containing a cross-linking agent, at most 90 parts of colloidal inorganic particles; and at least 10 parts of a polymeric binder, where the weight percentage of colloidal inorganic particles is greater than the weight percent of polymeric binder*) because it would still lack a crosslinking agent.

In light of all of the above, no combination of US'950 and US'780 discloses or suggests the claimed invention because not all of the elements of the claimed invention are disclosed or suggested therein. Accordingly, withdrawal of this ground of rejection is respectfully submitted.

Applicants respectfully submit that the present application is now in condition for allowance. Favorable reconsideration is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact below-signed by telephone.

Please charge the amount of \$00.00 required for the request for extension of time to our Deposit Account No. 09-0525. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 09-0525. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time.

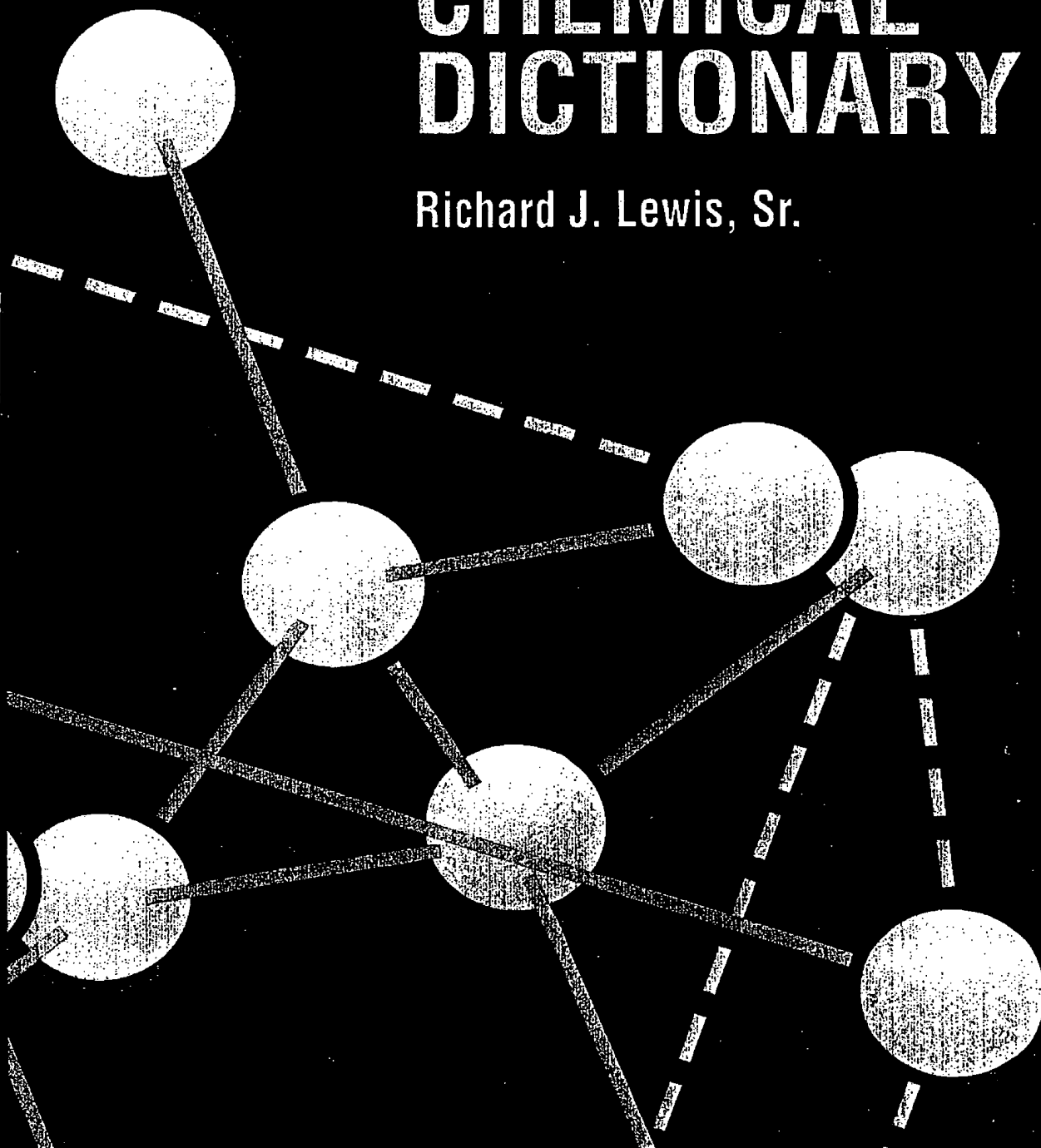
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| | Thomas W. Barnes III, Ph.D. Registration No. | 52,595 |

Twelfth Edition

Hawley's CONDENSED CHEMICAL DICTIONARY

Richard J. Lewis, Sr.

Exhibit
A



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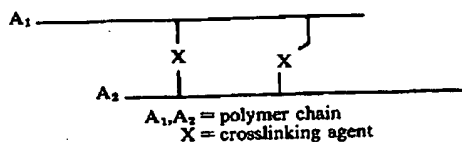
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CIP

Cross-Bevan (viscose) process. Production of rayon by treatment of cellulose with alkali and carbon disulfide to yield cellulose xanthate, solution in dilute caustic, and extrusion of the viscous "Viscose" into a coagulating bath, a 7-10% sulfuric acid solution containing 1-5% zinc sulfate and an active surface agent.

crosshead. A device attached to the head of an extrusion machine which permits the material to be extruded in opposite directions simultaneously at right angles to the barrel. It is applicable chiefly to coating of wire, cable, and small-diameter hose.

cross-linking. Attachment of two chains of polymer molecules by bridges, composed of either an element, a group, or a compound, which join certain carbon atoms of the chains by primary chemical bonds, as indicated in the schematic diagram.



Cross-linking occurs in nature in substances made up of polypeptide chains which are joined by the disulfide bonds of the cystine residue, as in keratins, insulin, and other proteins. Polysaccharide molecules can also cross-link to form stable gel structures (dextran). Cross-linking can be effected artificially, either by adding a chemical substance (cross-linking agent) and exposing the mixture to heat, or by subjecting the polymer to high-energy radiation. Examples are (1) vulcanization of rubber with sulfur or organic peroxides, (2) cross-linking of polystyrene with divinylbenzene, (3) cross-linking of polyethylene by means of high-energy radiation or with an organic peroxide, (4) cross-linking of cellulose with dimethylol carbamate (10% solution) in durable-press cotton textiles. Cross-linking has the effect of changing a plastic from thermoplastic to thermosetting. Thus, it also increases strength, heat and electrical resistance, and especially resistance to solvents and other chemicals. See also vulcanization, polyethylene, keratin.

cross section. (1) A measure of the probability that a nuclear reaction will occur. Usually measured in barns, it is the apparent (or effective) area presented by a target nucleus (or particle) to an oncoming particle or other nuclear radiation, such as a photon or gamma radiation. Also called capture cross section.

(2) A section made by a plane cutting through a

solid. Tissue cross sections are widely used for microscopic observation.

"Crosultaines" [Croda]. (sulfobetaines). TM for tallow and coconut versions.

Use: Mild surfactants for baby shampoos, excellent for foam boosting, stabilization, and thickening.

crotonaldehyde. (2-butenal; crotonic aldehyde; β -methyl acrolein). CAS: 4170-30-3. $\text{CH}_3\text{CH}:\text{CHCHO}$. Commercial crotonaldehyde is the trans isomer.

Properties: Water-white, mobile liquid; pungent, suffocating odor; turns to a pale yellow color in contact with light and air. A lachrymator. Very soluble in water; miscible in all proportions with alcohol, ether, benzene, toluene, kerosene, gasoline, solvent naphtha. D 0.8531 (20/20C), bp 102C, flash p 55F (12.7C), fp -69C, vap press 30 mm Hg (20C).

Derivation: Aldol condensation of two molecules of acetaldehyde.

Grade: Technical, 87% water-wet form.

Hazard: Irritating to eyes and skin. TLV: 2 ppm in air. Flammable, dangerous fire risk. Explosive limits in air 2.9-15.5% by volume.

Use: Intermediate for n-butyl alcohol and 2-ethylhexyl alcohol, solvent, preparation of rubber accelerators, purification of lubricating oils, insecticides, tear gas, fuel-gas warning agent, organic synthesis, leather tanning, alcohol denaturant.

crotonic acid. (2-butenic acid; β -methacrylic acid). CAS: 3724-65-0. $\text{CH}_3\text{CH}:\text{CHCOOH}$. Exists in cis and trans isomeric forms, the latter being the stable isomer used commercially. The cis form melts at 15C and is sometimes called isocrotonic acid.

Properties: White, crystalline solid; d 0.9730, mp 72C; bp 185C; soluble in water, ethanol, toluene, acetone; flash p 190F (87.7C) (COC). Combustible.

Derivation: Oxidation of crotonaldehyde.

Grade: 97%.

Hazard: Strong irritant to tissue.

Use: Synthesis of resins, polymers, plasticizers, drugs.

crotonic aldehyde. See crotonaldehyde.

croton oil. (tigilium oil). CAS: 8001-28-3.

Properties: Brownish-yellow liquid, d 0.935-0.950 (25C), refr index (40C) 1.470-1.473. Soluble in ether, chloroform, and fixed or volatile oils; slightly soluble in alcohol. Chief constituents: Glycerides of stearic, palmitic, myristic, lauric, and oleic acids and croton resin, a vesicant.